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SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Multimedia services

Framework for data asset management

Recommendation ITU-T F.743.21

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Recommendation ITU-T F.743.21

Framework for data asset management

Summary

Recommendation ITU-T F.743.21 defines a data asset management framework with its corresponding objects, activities and supports. Objects of data asset management are data assets, which include master data, metadata, and other data assets. Activities include data standards management, data model management, data quality management, data security management, data valuation management, and data sharing management. To ensure the proper level of management, the corresponding people in charge, rules and regulations, and technology tools are needed.

Keywords

Big data, data asset management.

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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Framework for data asset management

1 Scope

This Recommendation defines a data asset management framework with its corresponding objects, activities and supports, which can be used as a reference for a government and enterprises to apply data asset management, as well as a reference framework for data management platform and product design. The scope of this Recommendation includes:

– Management object,

– Management activities,

– Management support.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Y.3519]   Recommendation ITU-T Y.3519 (2018), *Cloud computing – Functional architecture of big data as a service*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

3.1.1 metadata: [ITU-T Y.3519]: Data about data or data elements, possibly including their data descriptions, and data about data ownership, access paths, access rights and data volatility.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 data standards: Normative constrains to guarantee consistency and accuracy of data usage and exchange.

3.2.2 data quality: The integrity, normalization, consistency, accuracy, uniqueness, and relevance of data, which is the premise and guarantee for data mining.

3.2.3 data asset management: A set of business functions for planning, controlling and providing data and information assets, including developing, executing and monitoring data related plans, policies, programs, projects, processes, methods and procedures, so as to control, protect, deliver and improve the value of data assets. Data asset management requires a full integration of business, technology, and management to ensure that the value of data assets is maintained and added.

3.2.4 data management platform: Software products that provide some functions for data management, including data source management, metadata management, data standard management, master data management, data quality management, and data flow management.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DBMS   Database Management System

5 Conventions

In this Recommendation, the following conventions are used:

– The keywords "is required" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this Recommendation is to be claimed.

– The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement needs not be present to claim conformance.

– The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.
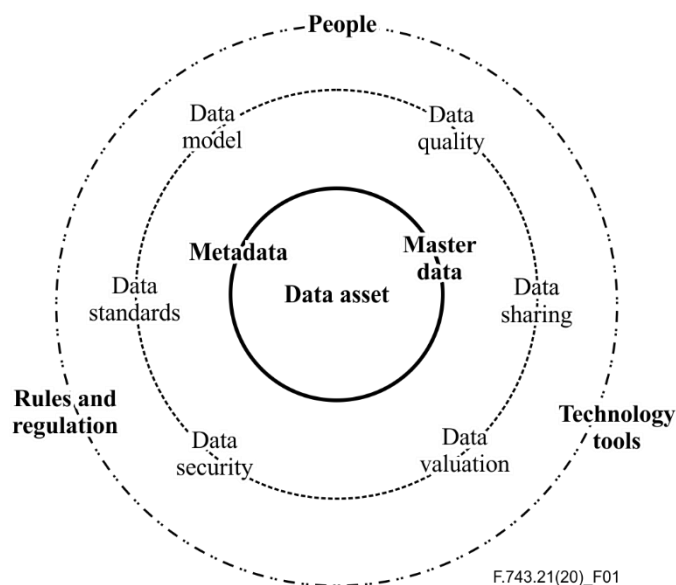
6 Overview

The framework of data asset managements is shown in Figure 1, and includes three main aspects: management objects, management activities and management support.

Object: Objects of data asset management are data assets, which include master data, metadata, and other data assets. The management of metadata and master data is the key activities of data asset management.

Activity: Activities of data asset management include data standards management, data model management, data quality management, data security management, data valuation management and data sharing management.

Support: In order to ensure the proper level of management, the corresponding people in charge, rules and regulations, and technology tools are needed.

Figure 1 – Overview of data asset management

7 Management objects

Objects of data asset management are data assets. Master data and metadata can be abstracted from data assets.

Master data is the data representing the core business object and the transaction business of an enterprise. These specific data will be shared and applied across various business processes, departments and systems.

Metadata is the data about data, which describes the data itself (e.g., database, data models), the concepts the data represents (e.g., application system, business process) and the relationships between them.

7.1 Metadata management

Metadata management is planning, implementation, and control of activities to enable access to high quality integrated metadata. Metadata management ensures that people understand data content and can use data consistently based on documenting and managing organizational knowledge of data-related terminology, and on collecting and integrating metadata from diverse sources.

Metadata can be categorized into three types, business, technical and operational metadata, based on how metadata is used.

The main activities of metadata management are recommended to include:

– Establishing and maintain metadata standards,
– Building metadata management tools,
– Creating, collecting, and integrating metadata,
– Managing metadata repository,
– Distributing and delivering metadata,
– Metadata analysis (e.g., data lineage and impact analysis, data mapping).

7.1.1 Technical metadata

Technical metadata describes information about the technical details of data, data storage systems, and processes that move data within and between systems, including database object properties, access permissions, file format schema definitions, etc.

7.1.2 Business metadata

Business metadata describes the concepts, relationships, rules, and other details of data governance, including the non-technical names and definitions of concepts, subject areas, entities, attributes, and calculations.

7.1.3 Operational metadata

Operational metadata describes details of the processing and accessing data, including history of data extracts, schedule anomalies, data archiving and retention, etc.

7.2 Master data management

Master data management is a set of rules, applications, and technologies to ensure the uniformity, accuracy, semantics, consistency, and accountability of the enterprise's officially shared master data assets.

The main activities of master data management are recommended to include:

– Understanding and defining the requirements of master data management,
– Identifying and assessing master data sources,
– Maintaining data integration architecture,

– Defining and maintaining data matching rules,

– Establishing process approval mechanism for master data collection and creation,

– Easy to modify, monitor and update the main data across the integrated systems.

8 Management activity

8.1 Data standards management

Data standards refer to the normative constraints that guarantee the consistency and accuracy of data use and exchange. Data standards management is planning and publishing a set of standards regarding data items, datasets and data models to make sure that data is complete, valid, consistent, standard, and easy to be shared and managed.

Data standards can usually be categorized into basic data standards and indicator data standards. Basic data standards generally include metadata standards, master data standards, data dimension (measurement) standards, logical data model standards, physical data model standards, and common code standards. Indicator data standards generally concern basic indicators and calculation indicators. Calculation indicator is a combination of two or more basic indicators.

The main activities of data standards management are recommended to include:

– Understanding data standardization requirements,

– Constructing data standards system and specification,

– Planning the implementation roadmap and scheme of data standardization,

– Establishing data standards management methods and process requirements,

– Building data standards management tools,

– Evaluating the development of data standardization.

8.2 Data model management

Data model management is the process of discovering analysing, and scoping data requirements, and then representing and communicating these data requirements in a precise form called the data model. This process is iterative and may include a conceptual, logical, and physical model.

The main activities of data model management are recommended to include:

– Identifying the information and business requirements,

– Building data model management process standards,

– Selecting or creating data model management tools,

– Defining entities, attributes, and business-oriented key relationships,

– Building diagrams to represent definitions,

– Building a set of conceptual, logical, and physical models,

– Reviewing and improving the data models (scope, content, and structure),

– Maintaining the data models.

8.2.1 Conceptual model

Conceptual model is oriented by objective-world, and it mainly describes each entity and the relationships between entities, which captures the high-level data and is independent from database management system (DBMS).

8.2.2 Logical model

Logical model is a business-oriented model based on business processes and business scenarios, and it can be used to guide implementation in different DBMS systems. The logical model includes network data model, hierarchical data model, etc.

8.2.3 Physical model

The physical model describes the organizational structure of data in a storage media. The design of the physical model is based on the logical model, and is adapted to function considering a set of specific DBMS, operating system and hardware. It also should be designed with the relevant capabilities and requirements of system performance.

8.3 Data quality management

High data quality guarantees that the data application process is carried out correctly. Data quality management means planning, implementation, and control of activities that apply quality management techniques to data in order to excavate the data value and to meet the needs of data consumers. Producing high quality data is a necessary premise for developing data products and services, and this process requires cross-functional commitment and coordination, including building quality assessment system, managing data through its lifecycle by setting standards, etc.

A data quality dimension is a measurable feature of the characteristic of data, which can be used as a basis for an initial data quality assessment. Dimensions of data quality include:

– Accuracy: The degree to which data correctly describes the real object that is being described.
– Completeness: The proportion of data stored against the potential for 100%.
– Uniqueness: The characteristic of an entity instance whereby it will not be recorded more than once based on how it is identified.
– Timeliness: The degree to which data represents reality at the required point in time.
– Validity: Data is valid if it conforms to the syntax (format, type, range) of its definition.
– Consistency: The absence of difference, when comparing two or more representations of a thing against a definition.

The main activities of data quality management are recommended to include:

– Realizing the importance of data quality improvement,
– Defining data quality requirements,
– Analysing and assessing data quality,
– Defining measurements in terms of data quality dimensions,
– Identifying critical data and business rules,
– Testing and validating data quality requirements,
– Assessing data quality service levels,
– Constant measuring and monitoring of data quality,
– Diagnosing data quality issues,
– Analysing root cause of poor data quality,
– Defining a data quality improvement strategy,
– Cleaning and correcting data quality flaws,
– Designing and operating data quality management tools.

8.4   Data security management

Data security includes the privacy, confidentiality regulations, contractual agreements, and business requirements of data assets. It involves not just preventing inappropriate access, but also enabling appropriate access to data.

Data security management refers to the planning, development, and execution of security policies and procedures to provide proper authentication, authorization, access, and auditing of data assets.

The main activities of data security management are recommended to include:

–   Identifying data security and regulatory requirements,

–   Defining data confidentiality levels,

–   Defining data security strategy and standards,

–   Defining security roles and corresponding assignment hierarchy,

–   Defining data security control scope and procedures,

–   Monitoring user identity authentication and access behaviour,

–   Deploying data security control systems or tools,

–   Managing security policy compliance,

–   Auditing data security and compliance activities.

8.5   Data valuation management

Data valuation management is a measurement of the intrinsic value of data, including the cost and application value of data. The cost of data includes collection and storage cost (labour costs, IT equipment and other direct and indirect costs) and operation and maintenance costs (business operation fees, technical operation fees, etc.). Data valuation mainly involves classification of data assets, assessment of frequency of usage, identification of the objects and assessment of the effects of use.

The main activities of data valuation management are recommended to include:

–   Determining the level of enterprise data integration,

–   Describing the application scenarios of data,

–   Calculating the cost of enterprise data assets,

–   Calculating the income of data in different application scenarios,

–   Calculating the overall value of enterprise data assets.

8.6   Data sharing management

Data sharing management refers to a series of activities of sharing and exchanging data to realize the external value of data. In this process, data owner excavates the hidden information by building data model and sharing or releasing an application product as a combination of these massive information in a form of compliance security.

The main activities of data sharing management are recommended to include:

–   Defining data asset operation and circulation of monitoring indicators,

–   Designing data asset operation and circulation of management plan,

–   Formulating data resource operation and circulation of management methods and implementation process requirements,

–   Monitoring data asset operation indicators,

–   Supervising the implementation of compliance management requirements such as data circulation,

–   Analysing operational circulation indicators, evaluating operational performance, and improving it.

9   Management support

People, rules and regulations, and technology tools are three main factors to ensure that data the management process is launched in the correct order.

9.1   People

People are the core of data management process. The main activities related to people are to:

–   Establish and maintain enterprise strategy of data management and form data management culture,

–   Establish organizational structure with clear rights, duties, and smooth communication,

–   Form regular training mechanism for personnel who is engaged in data management.

9.2   Rules and regulations

Rules and regulations are requirements of data management process that should be guaranteed. The main activities include to:

–   Establish proper rules and regulations, such as management method, management process, technical specifications,

–   Establish audit mechanism and apply it through the life cycle of data management.

9.3   Technical tools

Technical tools are fundamentals of data management process. The main activities include to:

–   Select and build technical tools and platforms to meet the needs of enterprises,

–   Build technical and operational team to maintain the data management platform.

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